

REMARKS

In the non-final *Office Action* dated May 11, 2007, the Examiner objected to claim 22 because of a typographical error; "on" was intended to read --one --. This error has been corrected in the foregoing amendments.

Numerous rejections were also made on the basis of art. Claims 8, 10, 13, and 18-24 were rejected under §102(b) as being unpatentable over United States Patent No. 5,521,266 to *Lau*. Claims 8, 10, 13, 14 and 18-23 were rejected under §102(b) or alternatively under § 103(a) as being unpatentable over United States Patent No. 5,631,317 to *Komatsu*. Claims 8, 10, 13 and 18-23 were rejected under § 103(a) as being unpatentable over United States Patent No. 5,631,317 to *Komatsu* in view of United States Patent No. 5,521,266 to *Lau*. Claims 2-6, 9, 11, 12, 16 and 25 under § 103(a) as obvious over the '266 *Lau* patent in view United States Patent No. 5,976,694 to *Tsai*. The Examiner rejected claims 2-6, 9, 11, 12, 16, and 25 under § 103(a) as obvious over the '317 *Komatsu* patent in view of United States Patent No. 5,976,694 to *Tsai*. The Examiner rejected claims 2-6, 9, 11, 12, 16, and 25 under § 103(a) as obvious over the '317 *Komatsu* patent in view United States Patent No. 5,521,266 to *Lau* in further view of United States Patent No. 5,976,694 to *Tsai*.

As amended, and in view of the enclosed *Declaration under 37 CFR §1.132*, this application is believed in condition for allowance. The present invention relates to nonwoven products with emulsion binders that are salt triggerable in that the products are dispersible (as opposed to soluble) in water, but not salt solutions. Thus the products are "flushable" and will not clog plumbing or foul septic systems in use and differ markedly from the art cited in that films of the binder polymer are dispersible, rather than soluble in tap water and are further characterized in that divalent ions do not inhibit redispersibility in water. Claims 22 and 27 are representative:

22. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer
 - and
 - ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are *dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out*, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

27. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and

wherein said latex polymer composition forms films that *are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out*, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt; and

wherein the films are further characterized in that divalent ions do not inhibit redispersibility in water.

Support for the dispersibility recitation is found in the application as filed, page 4, lines 1 and following, also paragraph 15 of the application as published:

[0015] The polymer is dispersible, rather than soluble, in water. Dispersible, as used herein, means that in tap water, a film formed from the polymer breaks into small discrete pieces or particles that can be filtered out. These pieces are capable of being separated from the water. While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive emulsion polymers useful in the present invention are described in U.S. patent application Ser. No. 09/823,318, incorporated herein by reference.

Support for the recitation that divalent ions do not inhibit redispersibility is found in United States Patent No. 6,683,129 (Application No. 09/540,033 incorporated herein in its entirety), col. 4, lines 19-48:

Unlike conventional water-soluble polymers, the aqueous
 20 emulsions of the present invention do not require divalent
 ion inhibitors. Film formation of latexes differs from film
 formation of solution polymers since particle coalescence is
 needed to form a film of high cohesive strength in emulsion
 polymers. For solution polymers, particle coalescence is not
 25 necessary because the solvent acts as a plasticizer which aids
 in the film formation by allowing polymer chains to mix and
 entangle. For emulsion polymers, the cohesive strength of
 the polymer film is reduced if the particles do not fully
 coalesce because of the reduction of chain entanglements.
 30 For emulsion polymers, the surface active layer remains as
 an interfacial boundary between particles and prevents full
 chain entanglement to the extent observed from solution
 polymers. As a result, films derived from the aqueous
 emulsions of the present invention will readily disperse in
 35 the presence of water. In addition, the novel polymer film
 will also disperse in hard water since divalent ions do not
 inhibit the redispersability by the film derived from emul-
 sions. In contrast, for polymer films derived solution, hard
 water is less effective in solubilizing the polymer since
 40 divalent ions inhibit the movement of the highly entangled
 polymer chains. For films derived from solution polymers,
 ion regulating agents are required to enhance the solubiliza-
 tion in hard water. This is the main reason why the aqueous
 emulsions of the present invention do not require a divalent
 45 ion inhibitor (sequestering agent) to aid in the redispersab-
 ility in tap water, especially hard water. Preferably the
 particle size of the water-dispersible copolymer is from
 about 0.05 micron to about 0.8 micron.

The claims submitted previously have been amended to clearly differentiate over
 art and the new claims recite features not even remotely suggested by the references. The
 enclosed *Declaration under 37 CFR §1.132* is believed to resolve any doubt as to
 inherency. In this regard, Counsel notes *In re Robertson* and *Metabolite Labs*:

The fact that a certain result or characteristic may occur or be present in
 the prior art is not sufficient to establish the inherency of that result or
 characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed.
 Cir. 1993) (reversed rejection because inherency was based on what would result

due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). “To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’ ” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

“An invitation to investigate is not an inherent disclosure” where a prior art reference “discloses no more than a broad genus of potential applications of its discoveries.” *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1367, 71 USPQ2d 1081, 1091 (Fed. Cir. 2004) (explaining that “[a] prior art reference that discloses a genus still does not inherently disclose all species within that broad category” but must be examined to see if a disclosure of the claimed species has been made or whether the prior art reference merely invites further experimentation to find the species).

It is further noted that **all** of the claim limitations need to be considered, especially the objectives and functional features not merely the compositional aspects. In this regard, Counsel notes *In re Goffe*:

[W]e cannot agree with the board’s determination that the claims are inclusive of materials which would not apparently be operative in the claimed process. *** Having stated the objective *** together with the process steps, use of materials which might prevent achievement of the objective *** can hardly be said to be within the scope of the claims.

Id. At 431 (citing *In re Geerdes*, 180 USPQ 789, 793 (CCPA 1974)).

Turning to the references, United States Patent No. 5,521,266 to *Lau* discloses the emulsion polymerization of hydrophobic hydrocarbon monomers using cyclodextrin. The ‘266 *Lau* patent is directed to a method for forming polymers from hydrophobic monomers. The emulsion polymerization approach taught involves dispersing the hydrophobic monomer and transporting it to the forming polymer. The process disclosed in that patent generates latex, and utilizes cyclodextrin to transport the monomer through the water phase to the polymer phase. The disclosed method utilizes macromolecular organic compounds which have a hydrophobic cavity to complex monomers which have low water solubility. The presence of cyclodextrin

facilitates the transport of hydrophobic long alkyl chain monomers through the aqueous phase so that they can be homo- or copolymerized in a conventional emulsion polymerization process. This enables the formation of polymers from low water solubility monomers by emulsion polymerization. Nowhere suggested are the claimed features of this invention. The polymers disclosed in the '266 patent do not resemble the emulsion polymer binders used in this invention, as discussed in more detail in the enclosed *Declaration under 37 CFR §1.132*. In particular, the polymers are not dispersible in water as is claimed.

The '317 *Komatsu* reference discloses solution-based salt-sensitive polymers which are solution polymerized in the presence of organic solvent. These polymers are unlike the emulsion binders used in the nonwovens of this invention as discussed in the enclosed *Declaration under 37 CFR §1.132*. This reference was also discussed at some length in the *Declaration under 37 CFR §1.132* that was filed with the *RCE* in this case (the "*March Declaration*"). With respect to new Claim 27 it is noted that the '317 *Komatsu* binders are ***inoperable*** in the presence of polyvalent cations. Col. 4, lines 51-59 describe the inoperability in the presence of polyvalent cations.

Examples of the inorganic salts to be added after the neutralization of the acrylic acid moiety of the polymer include neutral inorganic salts comprising a monovalent cation such as sodium chloride, potassium chloride, sodium bromide, sodium sulfate and potassium sulfate. **When a salt comprising a polyvalent cation such as a calcium salt or magnesium salt is added, the polymer is coagulated to make the formation of the self-dispersing emulsion impossible.**

The above points are underscored by the *March Declaration* where it is noted that the *Komatsu et al.* reference uses solution polymerization techniques, which are fundamentally different from the emulsion polymerization techniques that are used to fabricate the latex binders of the present invention. Specifically, the *Komatsu et al.* reference uses a single-phase polymerization process where the monomer components are polymerized in an acetone solvent medium. The resulting polymer is dissolved in the reaction medium. See, *March Declaration* at paragraphs 6-7.

The *Komatsu* reference teaches that the organic solvent used to polymerize the resin is distilled off, and water added, to leave the polymer component dispersed in the water portion. This is referred to as an "emulsion" form; however it is clear a water soluble polymer is involved. *See*, '317 *Komatsu* at col. 5, lines 25-40, reproduced below:

After the completion of the reaction, the organic solvent is mainly distilled off, while water is kept in the reaction solvent as far as possible. Therefore, the distillation is preferably conducted at a temperature ranging from the boiling point of the organic solvent to 140° C., such as 70° to 140° C., preferably 70° to 100° C. under a pressure ranging from reduced pressure of 20 mmHg to atmospheric pressure. Water is added when the amount of the organic solvent in the mixed solvent has been reduced to 5% or less, preferably 1% or less. Although the amount of water to be added is not particularly limited, it is preferably such that the water content of the reaction system is 100 to 900 parts by weight, more preferably 150 to 500 parts by weight, for 100 parts by weight of the polymer. In the presence of such an amount of water, the polymer easily self-disperses in water to form an emulsion.

See, also, col. 6, lines 19-31. Although *Komatsu* refers to this composition as an "emulsion," it is not emulsion polymerized as recited in the pending claims, nor is it stabilized by polymeric colloids or any other stabilizing agents. *See, also*, the *March Declaration* at paragraph 7.

In contrast to the polymerization procedures described in *Komatsu* which are *inoperable* in the presence of polyvalent salts, the latex polymers of the claimed invention are the emulsion polymerized in the presence of mono di, or trivalent salts, whereby a stabilizing agent is dispersed in water to form a plurality of nanometer-sized micelles which encapsulate the monomers and create a dispersed phase where the polymerization proceeds. *See, March Declaration* at paragraph 5 and paragraph 27 of the application as filed:

The process for producing salt sensitive emulsions of the invention involves the formation of a colloid stabilizer, followed by an emulsion polymerization using said stabilizer by means known in the art. The stabilizer may either be formed in situ, or added separately. A useful process for producing the salt sensitive emulsions is found in U.S. patent application Ser. No. 09/540,033 [now United

States Patent No. 6,683,129], incorporated herein by reference. The emulsion polymerization may be a batch, semi-batch, or continuous process.

Applicant also notes that the emulsion polymerization processes used to make the latex binder of the invention impart critical structure and attributes to the polymer, and ultimately to the non-woven web, which are important in salt-sensitive binder applications, and readily distinguish it from similar resins which are solution polymerized. The distinction is noted in the pending application at page 4, lines 4-15:

While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water.

United States Patent No. 5,976,694 to *Tsai* is directed to compositions which allegedly provide significantly improved processability during the production of thermoformable articles comprising water-sensitive polymers. The compositions comprise a blend of at least one water-sensitive polymer and at least one polymer selected from polylactide, polyolefin-grafted with one or more polar groups, such as maleic anhydride, and other aliphatic polyesters. Desirably, the water-sensitive polymer comprises one or more copolyesters. The compositions may be spun into monocomponent or multicomponent fibers through conventional processes, such as spunbonding and meltblowing processes. The compositions may also be extruded to form films and other thermoformable articles. There is nothing in *Tsai* '694 that supplements the *Lau* or *Komatsu* references discussed above in any meaningful way and accordingly, all claims should be allowed.

It is further noted that patentability is supported here by unexpected results. In this regard, the Examiner's attention is drawn to the *Declaration of John C. Parsons*, dated September 12, 2005. *Note* particularly paragraph 6:

It is unexpected based on his experience, and based on *Cole et al.* that emulsion binders including polymers which are not fully *water-soluble* can form emulsion residue binders which readily *disperse in water* but that the *dispersibility is salt-sensitive* as is claimed in the above referenced application. This is a superior result because of the enhanced processability of emulsion binders and their shipping and handling advantages noted above. The result is unexpected because the non-water soluble polymers of the present invention have much lower water solubility than the acrylic acid, highly water soluble polymers disclosed by *Cole et al.*, for example; yet the binders are nevertheless dispersible in tap water and non-dispersible in salt solution. One of skill in the art would not expect this result; especially because of the fact the polymers are not water soluble.

It was noted in *In re Soni*, 34 USPQ2d 1684, 1687 and following (CAFC 1995), that evidence of unexpected results or surprising results ordinarily suffices for purposes of nonobviousness:

Mere improvement in properties does not always suffice to show unexpected results. In our view, however, when an applicant demonstrates substantially improved results, as Soni did here, and states that the results were unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary. Soni, who owed the PTO a duty of candor, made such a showing here. The PTO has not provided any persuasive basis to question Soni's comparative data and assertion that the demonstrated results were unexpected. Thus, we are persuaded that the Board's finding that Soni did not establish unexpected results is clearly erroneous.

The cases cited by the dissent are not to the contrary. Neither *De Blauwe*, nor *Wood*, nor *Lindner* requires a showing of unexpectedness separate from a showing of significant differences in result. Nor does *Merck*, which involved compositions understood to differ only in "a matter of degree." Those are not the facts here, where substantially improved properties were shown. Given a presumption of similar properties for similar compositions, substantially improved properties are ipso facto unexpected. The difficulty postulated by the dissent in distinguishing substantial from insubstantial improvement is no greater than the PTO and the courts have encountered, successfully, for many years in making judgments on the question of obviousness. It is not unworkable; it is simply the stuff of adjudication. Nor does it change established burdens of proof.

The PTO here established a prima facie case, the applicant responded to it with a showing of data, and the PTO made an inadequate challenge to the adequacy of that showing.

There is no doubt here that the improvements are substantial and unexpected. All claims are allowable for this reason as well.

This response is believed timely filed. Please charge any fees for additional claims to Deposit Account No. 50-0935. If any additional extensions or fees are necessary, please consider this a *Petition* therefore and charge any fees to Deposit Account No. 50-0935.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael W. Ferrell", written in a cursive style.

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